Reach360:A Comprehensive Safety Solution

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***Abstract*—Firstly, women safety is utmost concern in India. The efforts are always being done to look out for solutions in this regard. In the recent years GPS and android enabled mobile phones have become a tool of study for providing 'women safety' apps. Secondly, there is growing demand in the industry for entrepreneurship. Therefore, Reach 360-an app for women safety has been developed by girl students of the institute to meet both the objectives.**

Keywords—women safety, android, app, JSON, heatmaps

I. INTRODUCTION

Urban life in itself on one hand provides immense growth opportunities to women in developing nations, yet it presents great deal of hardships and risks when it comes to safety and security of working women. In global study conducted by it was found that 60% of residents living in cities of developing nations have had experienced some sort of crime at least once in the years 2010 to 2015. In 2012 United Nations (UN) carried out a study on Women Safety in New Delhi, India and realized that 92% of women had reported about sexual violence in generally open areas of the metropolitan. Thus it is not only the developing or under developed countries where women safety is a concern but also in developed nations.

We thought of designing an Android application **REACH 360** which will serve as a safety blanket for those in need or dangerous situation seeking out help.

II. RELATED WORK

The current situation clearly highlights the need to prioritize women safety. In emergency situations it is the mobile phone that comes handy for a victim. So as part of literature survey, we explored various mobile applications for women safety .

A. SAFETIPIN- COMPLETE SAFETY

The Safetypin app, [1] is a privy security app having features like GPS tracking, emergency, important contact numbers, directions to safe locations, pins displaying unsafe and free from danger areas and a Safety Score. The app is a good initiative towards providing safety to women and presents range of features like safe locations at the time of emergency and also comes with up with the feature of area selection and risks within that area to ensure proper safety

B. CIRCLE of 6

The Circle of 6 app, [2] offers a platform for users to quickly communicate their safety needs with six trusted individuals. It primarily focuses on sexual assault, although does include resources on intimate partner abuse. The app lets user add six of his/her well trusted friends who will be informed when user needs their help and will send a pre-decided SMS to the circle with user's location and a 'Come and Get Me' message. However. this application is available only for iOS platform and works only on iPhones.

C. VITHUAPP

Generally, when someone is in danger there is not enough time to make a phone call for help. And this is something that the VithU App, [3] lets the affected person do..On pressing the power button twice alert messages are sent out every two minutes to the listed and selected contacts, who receive messages along with the users' physical location, which get updated each time the message goes out.

D. NIRBHAYA BE FEARLESS

The Nirbhaya- be fearless app, [4] is another app that helps the user in sending an *sms* alert or call with a single touch in the event of an emergency. When the shake alert of app is activated, it sends victim's precise and accurate GPS location to pre-selected contacts from their contact list, with exact location updates every 300 meters of movement.

III. SYSTEM DESIGN & IMPLEMENTATION

A. System Design

The use case diagram given in Fig. 1 of the Reach360 android application identifies four actors-admin, user, server and police. Each of the actors has unique functionality with respect to the application. The user can begin using the app after login which includes the signup activity. User also has the ability to use all the features of the app like tracking the friend's location, Shake to send SOS alerts and crime alerts. Shake to send SOS alerts feature sends alerts to friends and the police/Women helpline number depending on the user of the application.

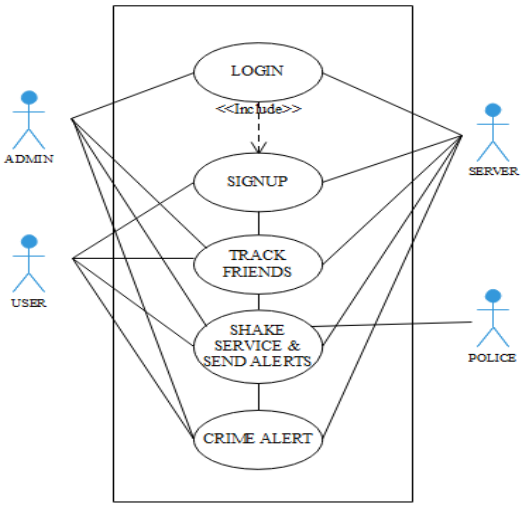

Fig.1. Use case diagram of Reach 360

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In order to keep the user updated about the crimes in the locality, crime alerts will be provided in the form of heat map visualization. The admin has all the functionalities of the users apart from the fact that admin doesn't sign up for using the application and thus can be logged in to the application by directly logging in. Moreover the Admin has access to all the Database information of all the application users, which can help the admin run backend algorithm to send alerts to all the users who are within 100m proximity of the victim apart from his friends or relatives and the police. The police acts as an external system which receives all the SOS alerts to act in the emergencies. Similarly, Server (Database) also acts as an external system which stores all the application data.

Flow of events is given in Fig. 2. Initially, when a user installs the application, then first of all, user has to register. After the registration of the user all the details get stored in the database. Then the user logins, if all the details entered are correct and verified from the database then user is redirected to the home page otherwise the user is asked to enter the details again. On the homepage the user has many options.

- Firstly the user can launch shake alert so that the user can just shake the phone which launches the application and then user can send emergency alerts along with the current location.
- Secondly, the user can allow their location to be tracked by anyone through the unique code. Any other person who has already installed our application enters this code can track the user. Similarly the user-A can also track another user-B by just entering their unique code and vice-versa.
- Lastly crime alert feature is also there which send alerts to users to be safe in that particular area when user passes by a place where recently a crime has been committed.

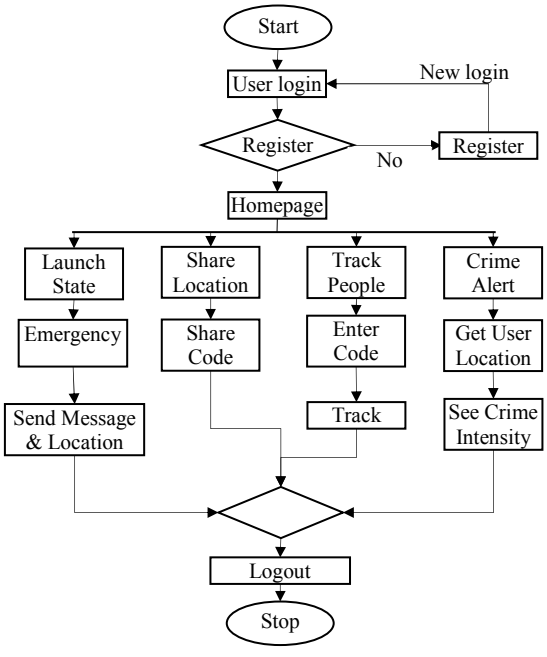

Fig. 2. Reach360 flow of events

B. *Implementation Details*

Important modules of the app and their implementation details have been discussed next:

1) Information Extraction Using NLTK

Sentence Segmentation, Sentence Boundary Disambiguation, and Sentence Tokenization: Sentence segmentation can be viewed as a classification task for punctuation: whenever we encounter a symbol that could possibly end a sentence, such as a period or a question mark, we have to decide whether it terminates the preceding sentence. It is used for finding out the List of Sentences, the problem in natural language processing where a sentence starts and ends. Therefore NLTK, an NLP tool, provides the function of sentence tokenization.

Next step was to do word tokenization.

a) Word Tokenization: It is used for finding the list of words from strings. For getting the list of words *word_tokenize* was called from *nltk.tokenize* module. *word_tokenize* as a wrapper function called tokenize by the *TreebankWordTokenizer*.

b) *Part-Of-Speech (POS) Tagging:* Part of Speech Tagging is basically the process of classifying the words into respective parts of speech and giving them grammatical labels based on both its definition and context.

2) Name Entity Recognition (NER): Name entity recognition involves the process known as '*Chunking*', in which many token-tag pairs were grouped together based on their relationship to one another. Name entities are definite noun phrases that refer to specific types of individuals, such as organizations, persons, dates etc. The inbuilt chunking method will then add labels to these chunks it deems as named entities. Then these were saved in the file used for further processing.

3) Crime alerts : Heatmap Visualization

The heatmap visualization of the crime prone areas has been done in Reach360 using the Google Maps Android API Utility Library which included a heatmap utility for visualizing large datasets. These datasets consisted of coordinates (in the form of a JSON file containing Latitude and Longitude) of the location to be visualized,thereby making it easier for the user to comprehend the relative intensity distribution of the dataset on the map. The visualization was shown through colors specifying intensity variation, in an area.

To add a heatmap to the application, we created dataset consisting of the coordinates for each location of interest.Then in Android Studio first create a 'HeatmapTileProvider', passing it the collection of 'LatLng' objects. Then create a 'newTileOverlay', passing it the heatmap tile provider, and add the tile overlay to the map. The utility supplies the 'HeatmapTileProvider' class, which implements the 'TileProvider' interface to supply the tile images for the 'heatmap. HeatmapTileProvider' accepts a collection of 'LatLng objects'.It then creates the tile images for various zoom levels, based on the radius, gradient and opacity options supplied.

4) Proximity alerts GEOFENCING

The GeoFencing API of Google takes up the current location of users to set up their proximity for sending and receiving alerts within that proximity. To setup the proximity alerts of application users, there is need for optimal radius to

be chosen, within which notifications could be sent and received, Fig. 3. By specifying the radius the API creates a geofence using the latitude, longitude and the radius to send notifications. In this application this API is used to get the location of the user-A in emergency and send alerts to another users within the proximity of 100m (optimal radius) from user-A. The main points to be focused upon was getting the user location and creating a geofence around the location of the user.

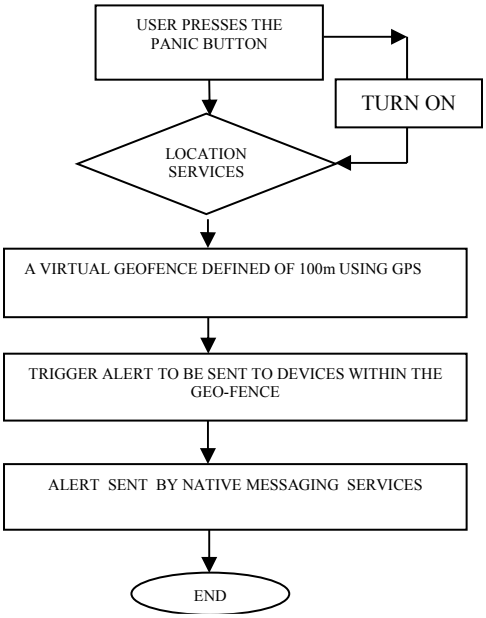

Fig 3: Geofencing flow of events

IV. RESULTS

This section of the paper describes the implementation of the application.

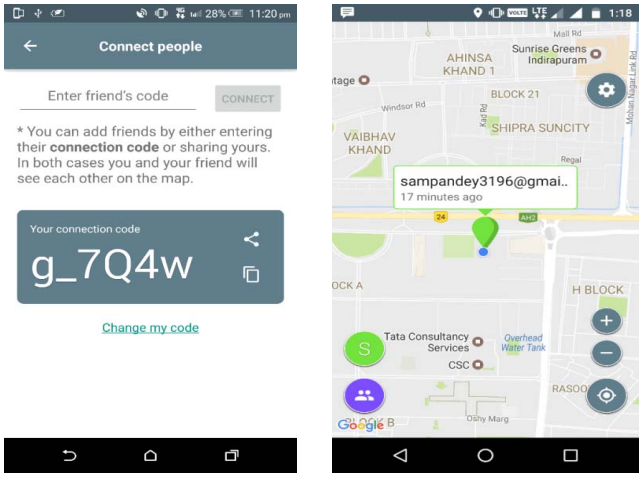

Fig.4: (a) Share code:For sharing location (b): Track locations:Tracking the friend

Through the screenshots we have made an effort to elucidate the working of Reach360.Once the application starts person is

Fig 5: Feature List

Fig.6:Heatmap for crime in Delhi

asked to register and if user is already a member then the person can directly login After the log in process the user is directed to the homepage wherein all the features of the application are portrayed Fig.5. Subsequently,the user can shake the device in the times of trouble.This action would open the app again and then the alert sending process would be triggered.Screenshots also show the location tracking feature in which as soon as the user installs Reach360, it generates an unique code.

Any other person who has already installed Reach360 enters this code can track the user. Similarly the user-1 can also track another user-2 by just entering their unique code and vice-versa, Fig. 4 (a) and (b). The crime alert feature highlights the current crime rate in Delhi, the small black dot shows the current location of the user and the variation in the colour scale shows the varying distribution of crime rate, Fig. 6 intensity in the particular state. Red-Severe crime rate, Yellow/Blue-moderate crime rate, Green/Sky blue-low to sparse crime rate near the given location.

V. CONCLUSIONS

In this paper, a low cost women safety application, suitable for varied types of environments has been discussed. The cost of this application is very less in comparison to other applications in the market,thereby providing complete safety solution and inching closer to the goal of creating safer cities.

REFERENCES

[1] Saftipin- Apps that keep you safe,[Online]Available: safetipin.com
[2] Circle of 6-Technology Safety, [Online] Available: https: //www. circleof6app.com
[3] VithU app specially for GIRLS SAFETY,[Online]Available: nothinggeek.com/download-vithu-app-feel-safe
[4] Nirbhaya: Be Fearless, [Online]Available: www.nirbhaya.mobi/